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Hello

Attached is the Draft redlined RACR for D-1 for your use in preparing partial RACRs. We may end up editing the text to further explain the issues with having partial RACRs in the Final version.

This document is going out to the agencies for review on Tuesday.

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Naval Facilities Engineering Command Southwest
San Diego, CA

Draft
Remedial Action Completion Report

Remedial Action in Parcel D-1
(Excluding Phase II Durable Cover)
Hunters Point Naval Shipyard
San Francisco, California

January 2018

Naval Facilities Engineering Command Southwest
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January 2018

Michael Ayala, PE Primary Author Technical Lead	Date
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Prepared for NAVFAC Southwest by
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Acronyms and Abbreviations

ABC	aggregate base course
AC	asphaltic concrete
APTIM	Aptim Federal Services, LLC
ASTM	ASTM International
Bay	San Francisco Bay
BMP	best management practices
CB&I	CB&I Federal Services LLC
CCSF	City and County of San Francisco
ChaduxTt	ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc.
COC	chemical of concern
CSO	Caretaker Site Office
DBR	*Final Design Basis Report, Parcel D-1, Hunters Point Shipyard, San Francisco, California*
EPP	environmental protection plan
FFA	Federal Facilities Agreement
FWV	fieldwork variance
HPNS	Hunters Point Naval Shipyard
IR	Installation Restoration
LLRW	low-level radioactive waste
LUC	land use control
Navy	U.S. Department of the Navy
O&M	operation and maintenance
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PPE	personal protective equipment
RA	remedial action
RACR	remedial action completion report
RAO	remedial action objective
RAWP	*Final Revision 1, Final Remedial Action Work Plan, Remedial Action in Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California*
RD	remedial design
RG	remediation goal
ROD	*Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California*
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
SFRA	San Francisco Redevelopment Agency
TCRA	time-critical removal action
VOC	volatile organic compound

1.0 Overview

This Remedial Action Completion Report (RACR) presents the specific tasks and procedures implemented by Aptim Federal Services, LLC (APTIM) during the installation of the durable cover at Parcel D-1 Phase I, Hunters Point Naval Shipyard (HPNS), San Francisco, California (Figure 1). This RACR also documents the completion of the RA to address potential chemicals of concern (COCs) in soil (excluding Phase II), groundwater, and radiologically impacted soil and structures at Parcel D-1. The Phase I durable cover portion of the remedial action (RA) was performed for the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Southwest, under Contract No. N62473-12-D-2005, Contract Task Order 0003. Base Realignment and Closure Program Management Office West managed the work elements under this Contract Task Order.

The time-critical removal action (TCRA) for radiologically impacted soil and structures at Parcel D-1 was completed in two phases. The first phase is summarized in the *Final Radiological Removal Action Report, Radiological Surveys of Buildings and Ground Surfaces, and Storm Drain and Sanitary Sewer Removal, Parcel D-1, Phase 1, Hunters Point Naval Shipyard, San Francisco, California* (CB&I, 2014). The second phase is described in the *Removal Action Completion Report, Parcel D-1, Phase II Radiological Remediation and Support* (Gilbane, 2017a). During the second phase of the TCRA, low-level radiological objects were discovered in areas that were not considered radiologically impacted. The Navy determined that these objects were within the fill soil used to expand the shipyard after 1946. Due to the unexpected low-level radiological objects in Parcel D-1 Phase II, only the Phase I portion of the durable cover was completed at this time. The completion of the Phase II portion of the durable cover is being completed under another contract, and construction is planned for 2018.

The Parcel D-1 RA for the durable cover was executed in accordance with the following documents:

- *Final Revision 1, Final Remedial Action Work Plan, Remedial Action in Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (RAWP; CB&I Federal Services LLC [CB&I], 2016)
- *Final Design Basis Report, Parcel D-1, Hunters Point Shipyard, San Francisco, California* (DBR; ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc. [ChaduxTt], 2011a), including the design drawings and construction specifications

The objective of the DBR (ChaduxTt, 2011a) and the RAWP (CB&I, 2016) was to implement the selected remedy for soil as established in the *Final Record of Decision for Parcels D-1 and*

UC-1, Hunters Point Shipyard, San Francisco, California (ROD; Navy, 2009). As the ROD specifies, the DBR (ChaduxTt, 2011a) included limited removal of chemicals in soil and a durable soil cover over the entire parcel to break potential exposure pathways. The remedial design (RD) for Parcel D-1 also included monitoring for volatile organic compounds (VOCs) in groundwater and a focused soil gas survey to monitor vapors below ground. The RD included land use control (LUC) restrictions to limit exposure of future landowners or users of the property to potentially residual hazardous substances and to maintain the integrity of the remedy. Chemical hot spot removal was performed in 2011 (ERRG, 2011) and the soil gas survey was performed in 2010 (Sealaska Environmental Services, 2013). This RACR describes the installation of the durable soil cover at Parcel D-1 Phase I only.

1.1 Project Schedule

The project schedule, as modified due to field conditions, is included as Figure 2. Field mobilization was May 31, 2016. Subgrade preparation occurred from July 7 through December 1, 2016. Seawall stabilization began on July 11 and ended on September 14, 2016. Paving activities started November 28, 2016, and ended on December 22, 2016. Extension of monitoring wells, installation of permanent fence, and the final topographical survey took place in December 2016 and January 2017. Operation and maintenance (O&M) began on February 6, 2017, and has a duration of one year.

1.2 Site Conditions and Background

This subsection presents a discussion of the site location, site description and history, nature and extent of contamination, and institutional and LUC.

1.2.1 Site Location

HPNS is located in southeastern San Francisco on a peninsula that extends east into the San Francisco Bay (Bay) (Figure 1). HPNS consists of 866 acres: 420 acres on land and 446 acres underwater in the Bay. Parcel D-1 is located on the southeastern portion of the former 98-acre Parcel D. Parcel D-1 is approximately 49 acres. Parcel D-1 Phase I is approximately 27 acres, and Phase II is approximately 22 acres.

1.2.2 Site Description and History

In 1940, the Navy obtained ownership of HPNS for shipbuilding, repair, and maintenance activities. After World War II, activities at HPNS shifted to submarine maintenance and repair. HPNS was also the site of the Naval Radiological Defense Laboratory from the late-1940s until 1969. HPNS was deactivated in 1974 and remained relatively unused until 1976. Between 1976 and 1986, the Navy leased most of HPNS to Triple A Machine Shop, Inc., a private ship repair company. In 1987, the Navy resumed occupancy of HPNS (Navy, 2009).

HPNS property was placed on the National Priorities List in 1989 pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986, because past shipyard operations left hazardous substances on site. In 1991, HPNS was designated for closure pursuant to the Defense Base Closure and Realignment Act of 1990. Closure at HPNS involves conducting environmental remediation and making the property available for nondefense use. Former Parcel D, which is in the central portion of the shipyard, was formerly part of the industrial support area and was used for shipping, ship repair, and office and commercial activities. Former Parcel D was divided into Parcels D-1, D-2, G, and UC-1.

Parcel D-1 is owned by the federal government under the jurisdiction of the Navy and is planned to be transferred to the City and County of San Francisco (CCSF). Based on the CCSF's reuse plan, Parcel D-1 is expected to be zoned to accommodate mixed uses, including industrial and maritime industrial uses (Former San Francisco Redevelopment Agency [SFRA], 1997). However, reuse plans are subject to change by the local government, and the *Amended Hunters Point Redevelopment Plan* (Former SFRA, 2010) contains scenarios that include residential reuses for portions of Parcel D-1.

Parcel D-1 consists of flat lowlands that were constructed by placing borrowed fill material from various sources, including crushed serpentinite bedrock from the adjacent highland and dredged sediments with surface elevations between 0 to 10 feet above mean sea level. The serpentinite bedrock and serpentine bedrock-derived fill material consist of minerals that naturally contain asbestos and relatively high concentrations of arsenic, manganese, nickel, and other metals. The hydrostratigraphic units present at Parcel D-1 are the same as at former Parcel D: A-aquifer, aquitard zone, B-aquifer, and a bedrock water-bearing zone. In addition, there is a thin layer of fill overlying bedrock; groundwater may be present in the fill and in the bedrock. Groundwater beneath Parcel D-1 includes the shallow A-aquifer and the deeper B-aquifer. Groundwater is not currently used for any purpose at Parcels D-1 (Navy, 2009).

Groundwater in the A-aquifer is not suitable as a potential source of drinking water. Groundwater in the B-aquifer underneath Parcel D-1 has a low potential as a future source of drinking water. Use of the B-aquifer groundwater is controlled by the CCSF and the San Francisco Public Utility Commission prohibits the use of groundwater in this area of the city. The San Francisco Bay Region of the California Regional Water Quality Control Board concurred with the Navy's conclusion that the groundwater in the A-aquifer is not suitable as a source of drinking water (Navy, 2009).

Groundwater flow patterns at Parcel D-1 are complex because they are potentially affected by the following:

- Groundwater sink located in adjacent Parcel E
- Groundwater mound located near the western boundary of Parcel G
- Leaks of groundwater into former sanitary sewers or storm drains
- Recharge from water supply lines
- Tides in the Bay

The groundwater at Parcel D-1 flows toward the Bay. The groundwater sink located in Parcel E is believed to have been caused by seepage of groundwater into sanitary sewer lines. This groundwater was then pumped off site to the local publicly owned treatment works, thereby lowering groundwater levels in the area. Flow patterns continue to change now that the pumping has been discontinued and as sanitary sewer and storm drain lines are removed throughout HPNS (Navy, 2009).

Parcel D-1 ecology is limited to plant and animal species adapted to the industrial environment. Viable terrestrial habitat is inhibited at Parcel D-1 because nearly all of the ground surface is paved or covered by structures. No threatened or endangered species are known to inhabit Parcels D-1 or its immediate vicinity (Navy, 2009).

1.2.3 Nature and Extent of Contamination

Activities associated with known or potential chemical releases at Parcel D-1 were identified and environmental investigations were conducted to identify and assess the nature and extent of contaminants in soil and groundwater. The following subsections summarize the nature and extent of contamination. Further details on the nature and extent of contamination are discussed in the ROD (Navy, 2009) and the *Revised Final Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California* (SulTech, 2007). The remedy was selected to remove or leave in place and cover soil where contaminant concentrations exceed these goals to prevent human exposure. No ecological risk has been identified associated with the site (Navy, 2009).

1.2.3.1 Soil

The chemicals of concern (COCs) in soil at Parcel D-1 that pose a potential risk to human health based on current and reasonably anticipated future land uses include metals, VOC, semivolatile organic compounds, and radionuclides. The Navy has removed waste materials and soil from various areas across Parcel D-1 since 1991. However, contaminants including polycyclic aromatic hydrocarbons (PAHs) resulting from industrial activities remained; areas where PAHs exceed remediation goals were excavated as part of the final remedy (ERRG, 2011).

Eleven hotspot locations were successfully remediated. Approximately 669 cubic yards of soil was removed from the hotspot locations and disposed off site (ERRG, 2011).

1.2.3.2 Radionuclides

The Navy identified radiologically impacted sites, including buildings, equipment, and infrastructure at Parcel D-1 associated with the former use of general radioactive materials and decontamination of ships used during atomic weapons testing in the South Pacific (Naval Sea Systems Command, 2004). The Navy performed a TCRA to address potential radioactive contamination in buildings, fill areas, former building sites, storm drains, and sanitary sewers at Parcel D-1 (Navy, 2006). The TCRA involved the following:

- Surveying radiologically impacted structures and former building sites
- Decontaminating (and demolishing if necessary) buildings and former building sites
- Excavating radiologically impacted storm drain and sanitary sewer lines
- Screening, separating, and disposing of radioactively contaminated excavated materials at an off-site, low-level radioactive waste (LLRW) facility

The radionuclides of concern at Parcel D-1 include cesium-137, cobalt-60, plutonium-239, radium-226, strontium-90, thorium-232, tritium (hydrogen-3), and uranium-235. The cleanup associated with the TCRA for radionuclides meets the remediation goals established in the ROD (Navy, 2009; CB&I, 2014; Gilbane, 2017a). Consequently, the RD developed in the DBR (ChaduxTt, 2011a) does not include further remediation for radionuclides.

1.2.3.3 Groundwater

The COCs in groundwater at Parcel D-1 that pose a potential risk to human health based on current and reasonably anticipated future land uses include VOCs, especially chloroform. The Navy conducted a treatability study at Parcels G and D-1 in 2008 to evaluate technologies to address VOCs in groundwater (Alliance Compliance Group, 2010). The treatability study addressed the groundwater plumes identified in the ROD (Navy, 2009) at Installation Restoration (IR) Sites 9, 33, and 71 and included additional delineation and assessment of the plumes as well as treatment of two VOC plume areas using zero-valent iron. The VOC plumes at IR Sites 9 and 33 are located on Parcel G. The VOC plume at IR Site 71 overlaps the boundary between Parcels G and D-1. The delineation and assessment phase concluded that treatment was necessary only for VOC plumes at IR Sites 9 and 71. A total of about 148,000 pounds of zero-valent iron was injected at 97 injection locations. The post-injection results from the treatability study showed concentrations of VOCs in groundwater and soil gas decreased. Concentrations of VOCs in groundwater at Parcel D-1 were below the remediation goals established in the ROD.

Consequently, the RD developed in the DBR (ChaduxTt, 2011a) does not include further remediation for VOCs in groundwater. However, monitoring for groundwater and soil gas is proposed to evaluate the potential for rebound in concentrations of VOCs after the treatability study. Groundwater at Parcel D-1 is in contact with the surface water of the Bay. Therefore, the Navy performed a screening evaluation to assess whether the concentrations of chemicals detected in groundwater could affect the surface water of the Bay (SulTech, 2007). The evaluation concluded that groundwater at Parcel D-1 did not pose a potential risk to saltwater aquatic organisms.

Groundwater monitoring is conducted throughout HPNS under the basewide groundwater monitoring program (Trevet, 2017a). For Parcel D-1, the COCs in groundwater are identified as VOCs and arsenic. In 2012, the VOC monitoring program at Parcel D-1 was discontinued because concentrations were below the RGs and were stable or decreasing (Navy, 2012). This left only the analysis of metals at Parcel D-1. In May 2017, no COCs exceeded their respective RGs at Parcel D-1. The current monitoring program includes semiannual sampling for metals analysis for three San Francisco Bay margin monitoring wells (IR17MW13A, IR22MW16A, and IR55MW02A). The *Final Remedial Action Monitoring Plan, Parcel D-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2011) objectives for these wells are to ensure that redevelopment does not mobilize metals that could migrate to San Francisco Bay and adversely impact ecological receptors. Current monitoring of these wells will continue in accordance with the *Final Remedial Action Monitoring Plan, Parcel D-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2011) because redevelopment has not yet been completed (Trevet, 2017b).

1.2.3.4 Soil Vapor

An investigation of potential chemicals in soil vapor was conducted in September 2010 for areas within Parcels B, D-1, G, and UC-2 (Sealaska Environmental Services, 2013). A total of 150 soil gas samples were collected from 110 locations encompassing 89 1-acre grid blocks. In addition, 29 soil samples were collected for geotechnical analysis to obtain physical parameters used for assessing the potential for vapor intrusion. Results from the investigation were evaluated for potential risk to human health using a basewide approach developed for HPNS (ChaduxTt, 2011b). A total of 30 grid blocks were sampled at Parcel D-1. Soil gas results collected from eight blocks indicated a potential risk to a future residential receptor that exceeded 10^{-6}. Consequently, the area requiring institutional controls for VOC vapors was recommended to be reduced from all of Parcel D-1 to the eight blocks where the potential risk exceeded 10^{-6}.

1.3 Deviations from Planning Documents

Fieldwork variances (FWVs) prepared and approved in coordination with remedial activities at Parcel D-1 are included in Appendix A of this RACR. During the Parcel D-1 RA, four FWVs were implemented during the execution of this project. The FWVs include the following:

- FWV-001: Revises Table E.1, "Import Material Comparison Criteria," for constituents with remediation goals (RGs) established in the ROD (Navy, 2009) and for metals with Hunters Point Naval Ambient Levels.
- FWV-002: Revises RAWP Section 6.2.9, "Seawall Stabilization," for the installation of high density polyethylene liner where holes have daylighted through the seawall.
- FWV-003: Provides clarification for compaction requirements in areas requiring seawall stabilization.
- FWV-004: Retracted.
- FWV-005: Revises the RAWP to clarify seawall stabilization and installation of the durable cover in areas with structurally sound interior seawalls.

1.4 Remedial Action Completion Report Organization

This RACR consists of eight sections and is organized as follows:

- **Section 1.0, "Overview"—**Section 1.0 provides an overview of the project, the project schedule, discusses site conditions and background, deviations from planning documents, and the RACR organization.
- **Section 2.0, "Remedial Action Objectives"—**Section 2.0 presents the remedial action objectives (RAOs) for this RA.
- **Section 3.0, "Remedial Action Construction Activities"—**Section 3.0 describes the RA construction activities.
- **Section 4.0, "Demonstration of Completion"—**Section 4.0 provides information to demonstrate completion of the RA described herein and the achievement of the RAOs for soil that were identified in the ROD through the installation and maintenance of the durable cover.
- **Section 5.0, "Ongoing Activities"—**Section 5.0 discusses activities currently ongoing at Parcel D-1 Phase I to maintain the remedy.
- **Section 6.0, "Community Involvement"—**Section 6.0 describes the community involvement activities associated with this RA.
- **Section 7.0, "Certification Statement"—**Section 7.0 presents the RACR certification statement.
- **Section 8.0, "References"—**Section 8.0 includes a list of documents used to compile this RACR.
- **Appendices A through L—**Submittals, Pre-construction and Mutual Understanding Meeting Minutes, Stormwater Management Paperwork, Photograph Log, Construction As-Builts, Import Sampling Results and Data Validation, Geotechnical Data, Water Quality Monitoring Results, Waste Data and Waste Manifests, Pre-Final and Final

Inspection Checklist, and the Fact Sheet are included as Appendices A, B, C, D, E, F, G, H, I, J, K, and L, respectively.

2.0 Remedial Action Objectives

The ROD (Navy, 2009) presents the RAOs for Parcel D-1 COCs in soil and groundwater. The RAOs for Parcel D-1 were developed in conjunction with the regulatory agencies and are listed as follows by medium:

- Soil RAOs:
  - Prevent exposure to PAHs and metals in soil at concentrations above remediation goals developed in the Human Health Risk Assessment for the following exposure pathways: ingestion of, outdoor inhalation of, and dermal exposure to surface and subsurface soil by industrial workers or construction workers.
  - Prevent exposure to VOCs in soil gas at concentrations that would pose unacceptable risk via indoor inhalation of vapors. Remediation goals for VOCs to address exposure via indoor inhalation of vapors may be superseded based on COC identification information from future soil gas surveys. Future action levels would be established for soil gas, would account for vapors from both soil and groundwater, and would be calculated based on a cumulative risk level of 10^{-6} using the accepted methodology for risk assessments at HPNS.
- Groundwater RAOs:
  - Prevent exposure by industrial workers to VOCs in the A-aquifer groundwater at concentrations above remediation goals via indoor inhalation of vapors from groundwater.
  - Prevent or minimize exposure of construction workers to metals and VOCs in the A-aquifer groundwater at concentrations above remediation goals from dermal exposure and inhalation of vapors from groundwater.
- Radiologically Impacted Soil and Structures RAOs
  - Prevent exposure to radionuclides of concern in concentrations that exceed remediation goals for potentially complete exposure pathways.

The remedy selected in the ROD (Navy, 2009) includes excavation of soil contaminated with PAHs, removal of existing soil stockpiles that potentially contain COCs, soil vapor controls for VOCs, institutional controls, and a durable cover to provide a physical barrier to minimize contact with metals that are within the naturally occurring background range. This RACR describes the Phase I durable cover component of the final remedy and also documents the completion of the RA to address potential chemicals of concern (COCs) in soil (excluding Phase II), groundwater, and radiologically impacted soil and structures at Parcel D-1.

3.0 Remedial Action Construction Activities

RA construction activities included the following:

- Pre-construction activities
- Mobilization
- Utility survey
- Site preparation
- Site maintenance
- Site security services
- Air monitoring
- Topographic survey, field observations, and photographic documentation
- Durable cover installation
- Water quality monitoring
- Protection and extension of existing monitoring wells
- Installation of permanent fence and signage
- Final as-built survey and installation of survey monument
- Waste characterization, disposal, and recycling
- Completion inspections
- Site cleanup and demobilization

3.1 Pre-Construction Activities

Pre-construction activities included permitting and notifications, meetings, and establishing temporary construction facilities. The following subsections describe the activities that were performed in preparation for remediation work.

3.1.1 Permitting and Notifications

CB&I obtained necessary authorizations from the HPNS Caretaker Site Office (CSO) and the Resident Officer in Charge of Construction (ROICC) for performing the RA at Parcel D-1. Prior to field activities, CB&I notified the Navy Remedial Project Manager (RPM), ROICC, CSO, appropriate fire department personnel, and HPNS security as to the nature of the anticipated work.

The work was conducted in accordance with Section 121(e) of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C., Section 9621[e]), as amended, which states that no federal, state, or local permits will be required for the portion of any removal or RA conducted entirely on site. Because this work was executed to support a RA and was conducted entirely on site, no other permits and fees were required for the RA. However, substantive provisions of applicable or relevant and appropriate requirements specified in the ROD (Navy, 2009) were fulfilled.

CB&I maintains a current annual excavation permit from the California Occupational Safety and Health Administration (Permit No. 2012-906196). The required 24-hour notification was provided before excavation activities began. Underground Service Alert (1.800.227.2600) was notified to obtain utility clearance a minimum of 72 hours prior to any intrusive activities. The permits and notifications were maintained for the duration of the field activities.

3.1.2 Pre-Construction and Mutual Understanding Meeting

Prior to mobilization, a pre-construction and mutual understanding meeting was held on May 19, 2016. The attendees included the Navy RPM, the ROICC, the CSO representative, and CB&I personnel. The purpose of this meeting was to develop a mutual understanding of the remedial activities and the contractor quality control details, including forms to be used, administration of on-site work, and coordination of the construction management and production. The meeting agenda and sign-in sheet are included in Appendix B.

3.1.3 Construction Quality Control Meetings

Contractor quality control meetings were held on a weekly basis throughout the course of fieldwork. At a minimum, the ROICC and the Project Quality Control Manager attended this meeting. The Navy RPM, and other site personnel, subcontractor, and vendor representatives attended as appropriate.

3.1.4 Health and Safety Meetings

Daily tailgate safety meetings were held before starting work. Construction staff, including subcontractors, attended these meetings and signed a tailgate safety meeting form. The meetings were held by the Site Safety and Health Officer and covered various safety issues.

3.1.5 Temporary Construction Facilities

An exclusion zone was established around the work area and delineated with temporary fencing and had appropriate signage posted. Temporary facilities were mobilized to the site and included restroom(s), hand washing station(s), security fencing, stormwater runoff controls, and secure storage (conex) boxes for storage of materials. The construction site layout, including parking areas, laydown areas, and temporary construction facilities, is shown on Figure 3.

3.2 Mobilization

Mobilization activities included site preparation, movement of equipment and materials to the site, and orientation and training of field personnel. On May 19, 2016, the appropriate Navy personnel, including the Lead RPM, RPM, ROICC and CSO, were notified regarding the planned schedule for mobilization and site remediation activities.

Upon receipt of the appropriate authorizations, field personnel, temporary facilities, and construction materials were mobilized to the jobsite on May 31, 2016. Dedicated laydown areas established in the field during mobilization, were used for short-term storage of equipment and materials.

3.3 Utility Survey

A geophysical survey was performed of the Phase I area from June 6 to 8, 2016, following a review of existing as-built drawings of Parcel D-1. The geophysical survey was conducted to identify any subsurface utilities that may exist via ground-penetrating radar and/or an electromagnetic instrument.

3.4 Site Preparation

Best management practices (BMPs) were implemented along the site perimeter and around stockpiles to prevent sediment from entering and leaving the site in accordance with the Stormwater Management Plan included in the Environmental Protection Plan (EPP; Appendix B to the RAWP; CB&I, 2016). Vegetation was cleared and grubbed as appropriate, and debris was removed for disposal. Additional debris and refuse were removed from within buildings at the site, in accordance with the Waste Management Plan (Appendix A to the RAWP; CB&I, 2016) and as described in Section 3.14 of this report.

Prior to intrusive activities, the vegetation was cleared from Parcel D-1 Phase I. The vegetation was managed as debris in accordance with the Waste Management Plan (Appendix A to the RAWP; CB&I, 2016). Mechanical equipment was used to cut the overgrown vegetation. Weed-eaters/whackers and chainsaws were used to clear the vegetation growing over areas that were sloped, uneven, bumpy, or too densely vegetated to allow for mechanical equipment access.

Aggressive dust control methods were implemented during earthwork and soil-handling activities by continuously wetting the work areas in accordance with the Dust Control Plan included in the EPP (Appendix B to the RAWP; CB&I, 2016). On-site stockpiles and disturbed areas were sprayed with dyed (green) "Gorilla Snot®" to stabilize the soil and minimize dust generation.

3.5 Site Maintenance

Good housekeeping practices were followed during site work. Periodic cleanup was conducted to keep the site and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris resulting from operations. The field engineering staff inspected BMPs prior to, during, and after all precipitation events following the criteria established in the Stormwater Pollution Prevention Plan (EPP, Appendix B to the RAWP; CB&I, 2016). During the dry season, BMP inspections were conducted at least once weekly. Inspection reports are included in Appendix C. Streets affected by the work were swept clean. Storage, staging, and work areas, along with all stairs and walkways on the site, were kept free of obstructions and debris. Tools and materials were neatly stored in a conex box.

3.6 Site Security Services

Unarmed security guards patrolled the site during nonworking hours. Tools and small equipment were secured daily in locked conex storage boxes. Air monitoring equipment, heavy equipment, and other equipment too large for the conex were monitored by security during nonworking hours.

3.7 Air Monitoring

Prior to commencing earthmoving activities, air monitoring stations were set up upwind and downwind of the construction activities at locations shown on Figure 3. Air monitoring was performed in accordance with the EPP (Appendix B to the RAWP; CB&I, 2016). The project monitored and sampled for particulate matter less than 10 microns in diameter, total suspended particulates, arsenic, lead, manganese, and asbestos during earthmoving activities. None of the construction activities exceeded the established threshold limit values at any time during project execution. Air monitoring results are provided in Appendix D.

3.8 Topographic Survey, Field Observations, and Photographic Documentation

A pre-construction topographic survey was performed by CBL Professional Services Inc., under the direction of a State of California licensed land surveyor, on May 12 and 16, 2016. Data from this survey were used to establish horizontal and vertical controls for the site, and to assess the pre-RA site topographic features, such as high and low points and the limits of the durable cover, which provided the basis for calculating the cut and fill quantities. The pre-construction topographic survey is provided in Appendix F.

Field observations were recorded daily and submitted electronically to the RPM, ROICC, and CSO on a daily basis as part of the Daily Production Report and Quality Control Report.

Photographs of the site were collected during the implementation of the RA activities. Photographs were taken during each aspect of work in order to provide a detailed photographic

history of the RA. Electronic versions of the photographs providing the date, location, and a description of activities shown can be viewed in the photograph log (Appendix E).

3.9 Durable Cover Installation

The selected remedy at Parcel D-1, as specified in the ROD (Navy, 2009) and detailed in the DBR (ChaduxTt, 2011a), is the installation of a durable cover intended to prevent human exposure to the underlying potentially contaminated soil (Navy, 2009). The durable cover consists of asphalt paving (new or existing), concrete, or the existing building foundations provided the foundations are intact and in good condition. Figure 4 presents a conceptual cross section of the asphalt pavement cover. The final cover grade for the site can be found in the as-built drawings (Appendix F). During all construction activities, dust was mitigated per the Dust Monitoring Plan included in the EPP (Appendix B to the RAWP; CB&I, 2016).

3.9.1 Seawall Stabilization

Repairs were necessary to the subgrade surface behind the Parcel D-1 Phase I seawalls and along portions of the piers to provide a stable vertical surface for tying the durable cover. Where necessary along the existing seawall, granular fill was used to restore the area behind the seawall to meet the surrounding grade so that the newly constructed durable cover could be projected to the edge of the site at a uniform grade. In areas where more than 18 inches of fill were required to match the final grade, gabion baskets were used to stabilize the seawall. As described is this report, gabion baskets, as manufactured by Maccaferri Terramesh, consisted of double twisted rectangular wire mesh basket (in accordance with ASTM International [ASTM] A 975) filled with fractured rock. Approximately 650 linear feet of the seawall was stabilized using gabion baskets (Figure 5). Gabion baskets were anchored as needed into the existing subgrade using horizontal layers of welded wire mesh as horizontal tie-backs, thus minimizing the outward pressure placed upon the weakened seawalls. A typical seawall repair cross section is provided in Figure 6.

Prior to installation of the gabion baskets, repair areas were prepared by excavating material to create a flat surface to install the baskets. Debris and refuse were removed or cut at grade to provide a clean surface. Each basket, typically measuring 9 feet long by 6 feet wide by 3 feet high, was filled with 4-inch to 8-inch fractured rock. Where more than one basket was required to match grade, the baskets were stacked inside the edge of the existing concrete seawall as shown on Figure 6. The individual baskets were then wired together. Depending on the degree of erosion, different areas required different arrangements of gabion baskets. In accordance with FWV 002 (Appendix A), in areas where holes daylighted through the existing seawall, geotextile filter fabric was placed beneath the backfill and extended up the inside of the wall to minimize the loss of backfill material during and after repair work behind the seawall. To further reduce the potential for loss of backfill due to erosion, a geotextile filter fabric was also installed above

the gabion structures to prevent fines from entering the Bay. New asphalt pavement was installed over the gabion stabilized areas as discussed in Section 3.9.2 of this report.

Along Berth 15 of the Gun Mole Pier (Figure 5), an approximately 40-foot long segment of seawall was identified as heavily corroded. In accordance with FWV 005 (Appendix A), gabion baskets were installed along the interior sheet pile wall rather than the outer seawall. The durable cover was installed to the edge of the gabion baskets and a permanent fence and an entry gate were installed surrounding the area to prevent pedestrian or automotive traffic from gaining access. The cross section of Berth 15 is provided in Figure 7. A photograph of the area with permanent fencing is included as Photograph 92 in the Photograph Log (Appendix E).

At the eastern end of the Gun Mole Pier, Berths 17, 18, and 19 were stabilized with ¼-ton (18-inch) riprap (Figure 5). Before the riprap was put in place, the debris and refuse on this portion of the site were removed or cut at grade to provide a clean surface for the riprap. A layer of geotextile fabric was placed on the exposed soil to minimize fines from entering the Bay as well as to prevent the underlying soil from "piping" through the stone. Riprap was placed over the geotextile fabric starting from the bottom of the area and continued up the slope. Distribution of the various sizes of riprap was obtained by controlled dumping of loads during final placement. The riprap extends from the edge of new asphalt pavement, beyond the seawall and out to the low tide line. Compaction of riprap was not required and placement was finished to present an even surface, free of mounds and windrows. A typical riprap stabilization detail is provided in Figure 8.

During seawall stabilization work, BMPs were implemented to minimize sediments from entering the Bay. BMPs included fiber rolls, sand bags, and the use of anchored turbidity curtains. Water quality monitoring is discussed in Section 3.10 of this report.

3.9.2 Existing Surface with No Asphalt

New asphalt pavement cover was installed over the portions of the site shown on Figure 5. The newly constructed durable cover included a minimum 4 inches of untreated aggregate base course (ABC) material and a minimum 2 inches of asphaltic concrete (AC) wear surface, for a total minimum cover thickness of 6 inches (Figure 4). Clean imported fill and regrading over the site was used to build up the existing ground surface where necessary to meet the prescribed foundation grade prior to construction of the durable cover.

Parcel D-1 is generally flat, and some grading of the existing surface was required for preparation of the foundation surface for construction of new asphalt pavement. Low-lying areas were filled with clean import material to minimize the accumulation of stormwater. Import fill met all geotechnical, chemical, and radiological requirements as specified in FWV 001

(Appendix A). Chemical, radiological, and geotechnical testing results of import fill are included in Appendix G.

Open utility vaults on the South Pier and Gum Mole Pier that could not be filled with import material were sealed prior to subgrade preparation. The open vaults were covered with steel plates which were tack welded and sealed with foam to provide a water tight surface upon which the final subgrade surface could be constructed.

Water flow patterns were generally maintained toward the Bay and the existing stormwater conveyance features. In accordance with the RAWP (CB&I, 2016), the 10-foot perimeter surrounding each site building was sloped to a minimum 1 percent grade to drain stormwater and minimize accumulation in the vicinity of the building foundations. Care was taken to not obstruct building entry points with the final cover, and the final cover was graded such that it would not extend above the elevation of the foundation slab. Foundation slabs below grade were removed or paved over with new AC. The remainder of the site was graded with a minimum 0.5 percent slope to drain water toward the existing drainage channels thereby minimizing the accumulation of water over the site.

Existing subgrade and imported fill were used to meet the prescribed subgrade elevation. Import fill was tested for compaction, grain size, Atterberg limits, and moisture (Appendices G and H). The subgrade was compacted as necessary before installation of the ABC layer. Site soils that did not meet the compaction requirements were reworked as needed. During placement of soil fill, continuous observation by a designated member of the field engineering staff ensured that materials met the suitability requirements and that moisture content was controlled to ensure compaction specifications were met. Geotechnical laboratory testing and field confirmatory tests were performed by Smith-Emery Geotechnical Services, a third party AASHTO certified geotechnical testing firm.

Areas requiring seawall stabilization were excavated to prepare each segment for gabion basket placement. When backfilled, compaction testing was performed at the frequency of 1 test per 30 cubic yards of fill, with a minimum of 1 test at the top layer of each excavation area as described in FWV 003 (Appendix A).

Following import of fill to meet the prescribed elevations, recycled ABC was added and compacted directly onto the prepared subgrade. The use of recycled ABC was approved by the Navy in Submittal 08, Recycled AB Material (Appendix A). The base course was added to a final thickness of at least 4 inches. ABC was tested for compaction; compaction reports are provided in Appendix H.

Following compaction of the newly placed ABC layer, hot mix AC was added as the final wear surface course to a compressed thickness of 2 inches (minimum) to complete the durable cover. As described in this report, hot mix AC is composed of aggregate bound together into a solid by an asphaltic cement (see Submittal 09, Bituminous Mix Design [Asphalt]; Appendix A). Installation of the hot mix AC layer was performed by a subcontractor, Granite Construction Company of Watsonville, California, with quality control oversight from CB&I and Smith-Emery Geotechnical Services. The mix was manufactured at an off-site mixing plant and transported to the site for spreading by a mechanical spreader. In accordance with the DBR (ChaduxTt, 2011a) and the Testing Plan and Log (Appendix H), two samples were collected per day per mix type from each truck. The uncompacted mix was tested for extraction in accordance with ASTM D 2172 and sieve analysis in accordance with AASHTO T 30. The samples were also tested for stability and flow in accordance with CTM 366. The geotechnical surveyors cored 4-inch diameter cores from the AC surface at the frequency of three cores per 200 tons of asphalt delivered. These samples were measured to confirm minimum 2-inch thickness, and returned to the laboratory for density in accordance with CalTrans Method 308. When allowable density was confirmed at each core location, the cores were filled with a concrete mix following the specifications in Section 03 30 00 of the DBR (ChaduxTt, 2011a) in accordance with RFI-002 (Appendix A). Geotechnical reports are provided in Appendix H.

3.9.3 Existing Asphalt Pavement Requiring New Asphalt or Asphalt Repair

All areas of Parcel D-1 Phase I required new asphalt (Figure 3); therefore, no asphalt repair was performed.

3.9.4 Existing Building Foundations

Five buildings are located within Parcel D-1 Phase I: Buildings 274, 306, 368, 369, and 308 (Figure 3). There are also several former building slabs and concrete utility vaults located on the South Pier and Gun Mole Pier. Existing building foundations and slabs, where intact and in good condition, constitute a durable cover as described in the ROD (Navy, 2009).

Each building slab and foundation were inspected to confirm the condition and make repairs as necessary. Prior to inspections, the buildings were cleared of debris and the building floors were cleaned to facilitate inspection. A transformer was located inside Building 369. The transformer oil was sampled and analyzed, and confirmed to not contain polychlorinated biphenyls (PCBs); the transformer was recycled as discussed in Section 3.14 of this report. General refuse, debris, and other loose materials were disposed in accordance with applicable standards as further discussed in Section 3.14 of this report.

Building 306A was a temporary structure built on wooden skids located adjacent to Building 306. The building was de-constructed and disposed as construction debris. Ceramic electrical insulators were mixed in with the construction debris and upon load out, alarmed the radiological

portal monitor. The debris was returned to Parcel D-1 and transferred to the HPNS Basewide Radiological contractor for subsequent disposal by the Navy's LLRW contractor. Waste disposal is further discussed in Section 3.14 of this report.

CB&I inspected building foundations and made note of cracks smaller than ¼ inch during the inspections. Cracks larger than ¼ inch were sealed with Rapid Set® CEMENT ALL® non-shrink grout, conforming to ASTM C 1107, as specified in Section 03 30 00 of the DBR (ChaduxTt, 2011a). Building 274 had large open trenches with exposed soil. The trenches were filled with soil, compacted to a minimum density of 95 percent of the maximum dry density at ±3 percent optimum moisture based on modified Proctor density testing (ASTM D 1557), and then covered with concrete. The openings in the foundations of Buildings 306, 308, and 384 were covered with a concrete mix following the specifications in Section 03 30 00 of the DBR.

3.10 Water Quality Monitoring

Prior to commencing seawall stabilization work, a turbidity curtain was deployed surrounding the section of seawall actively worked on to prevent sediments from entering the water column and the Bay. The turbidity curtain was installed in accordance with the manufacturer's instructions and was anchored to the piers and/or seawalls to fully encompass each area of repair.

During seawall stabilization construction activities, water quality monitoring was performed daily for dissolved oxygen, pH, and turbidity. Prior to beginning seawall stabilization work, water quality monitoring for dissolved oxygen, pH, and turbidity was performed from June 28 through July 1, 2016 to establish background values. Water quality monitoring was performed at one location approximately 20 feet outside the turbidity curtain (at the point of compliance), adjacent to the active work area from July 5 through November 7, 2016. The monitoring location was relocated as needed. The results of the readings from the location outside the curtain were compared to the background values to evaluate the effectiveness of in place controls. Water quality monitoring results are included in Appendix I. Visual indications of turbidity were not observed during seawall work, therefore, monitoring inside turbidity curtains was not performed.

3.11 Protection and Extension of Existing Monitoring Wells

Six existing monitoring wells are located within Parcel D-1 Phase 1 (Figure 3). During fieldwork, the monitoring wells were protected. Once paving was complete, the monitoring wells were extended to meet the final grade. The wells were extended using a polyvinyl chloride extension and a solvent weld schedule 40 polyvinyl chloride coupling, as shown on Drawing C5 (Appendix F). New concrete pads, sloped to drain away from the wells, and well boxes flush to the completed durable cover surface were installed where needed. New elevations were surveyed and are provided in Table 1.

3.12 Installation of Permanent Fence and Signage

Following completion of paving, approximately 1,950 feet of permanent fence and one entrance gate were installed along the Parcel D-1 Phase I boundary (Figure 4). The fence and gate were installed along E and Morrell Streets. Signs were posted at the Phase I entry point and along the permanent fence at an approximately 200-foot spacing to warn against trespassing and the hazards associated with the site per specifications provided in the design drawings included in the DBR (ChaduxTt, 2011a). Fence, gate and signage details are provided on the as-built drawing (Appendix F).

As discussed in Section 3.9 of this RACR, approximately 30 feet of fence and a pedestrian entrance gate were installed along a segment of Berth 15 on the Gun Mole Pier to prevent access to a corroded section of seawall. The fence and gate are shown on the as-built drawings (Appendix F). A photograph of the area with permanent fencing is included as Photograph 92 in the Photograph Log (Appendix E).

3.13 Final As-Built Survey and Installation of Survey Monument

Following completion of construction activities, the durable cover was surveyed by the California licensed land surveyor, CBL Professional Services Inc., on February 2 and 3, 2017. The permanent fence line and elevations for the extended monitoring wells were also surveyed. A permanent survey monument was installed on the cover surface as shown in Appendix F. The monument is a brass disk set in concrete and was located and protected as needed to prevent damage. The final as-built survey is included as Appendix F of this RACR.

3.14 Waste Characterization, Disposal, and Recycling

Several waste streams resulted from the Parcel D-1 Phase I remedial activities. These waste streams included soil and debris, metal debris, creosote treated wood, used personal protective equipment (PPE), and miscellaneous trash and debris. A summary of the waste quantities generated and disposed is presented in Table 3.

3.14.1 Soil and Debris

Small quantities of soil were generated from Buildings 308 and 369. The soil was containerized in four 95-gallon overpack drums and staged on-site pending waste characterization and off-site disposal during the Phase II portion of the RA.

Approximately 340 cubic yards of construction debris (including green waste) and 40 cubic yards of concrete debris were generated from RA activities. The debris was disposed as non-hazardous construction debris, with the exception of one bin. Debris originating from Building 306A included ceramic electrical insulators, which were broken and mixed in with the construction debris. Upon load-out through the HPNS radiological portal monitor, the alarm was

triggered. The debris was returned to Parcel D-1 and transferred to the HPNS Basewide Radiological contractor for subsequent disposal by the Navy's LLRW contractor. Dates of transportation, disposal weight/volumes, waste class and disposal facilities are summarized in Table 3.

3.14.2 Metal Debris

Approximately 87 tons of metal debris (scrap metal and electronics) were recycled during the Parcel D-1 Phase I RA. A large transformer was located in Building 369. The fluid was sampled and analyzed for PCBs. The results showed no PCBs in the transformer oil; therefore, the transformer was recycled as scrap metal. The metal was transported to the scrap metal recycler, Circosta Iron and Metal Company Inc., located at 1801 Evans Avenue, San Francisco, California. Analytical results for the transformer oil are included in Appendix J.

3.14.3 Other Waste

During clearing and grubbing, large sections of railroad track and creosote treated railroad tie waste were generated. The railroad ties were consolidated and disposed of as non-hazardous special waste. The waste manifests are included in Appendix J.

During subgrade preparation activities, potential asbestos-containing material was uncovered. The material was placed into an overpack drum and transferred to the Navy's waste contractor.

Lighting ballasts were found in Building 369. The ballasts were contained in one 95-gallon overpack container and staged on-site pending waste characterization and off-site disposal during the Phase II portion of the RA.

3.14.4 Used Personal Protective Equipment

On-site activities were performed in Level D PPE. Used PPE was consolidated and disposed as general trash.

3.15 Completion Inspections

Prior to demobilization, a pre-final site walk of Parcel D-1 Phase I was held with the Navy on January 17, 2017. During this site walk, a punch list of items to be corrected was generated by the Project Quality Control Manager. The punch list items were addressed once completed, a final site walk inspection was scheduled. The final site inspection was performed on February 14, 2017. The pre-final and final inspection reports are provided in Appendix K.

3.16 Site Cleanup and Demobilization

Site cleaning activities included removal of excess construction material, BMPs, wood, debris, and other foreign material; and removal of construction equipment and storage boxes.

Temporary facilities, including staging areas, containment areas, and temporary fencing, were removed from the work area. Demobilization was completed on February 3, 2017.

4.0 Demonstration of Completion

The RA is deemed to be complete when the RAOs are met. Table 2 summarizes the RAOs for Parcel D-1 and how they were achieved (excluding the Phase II durable cover) through proper implementation and satisfactory completion of the final remedy in accordance with the RD, and will continue to be achieved through development and implementation of the post-construction maintenance, repairs, monitoring, and institutional controls.

5.0 Ongoing Activities

Ongoing activities associated with the final remedy at Parcel D-1 include monitoring and maintenance of the Phase I durable cover installed as part of this remedy and implementation of LUCs related to the durable covers. As discussed in Section 1.0 of this RACR, only the Phase I portion of the durable cover was completed at this time. The completion of the Phase II portion of the durable cover is being completed under another contract, and construction is planned for 2018. The following subsections describe the ongoing components of the remedy.

5.1 Monitoring and Maintenance of Durable Cover

The Parcel D-1 Phase I durable cover, including stabilized seawalls cover, asphalt pavement cover, and repaired building foundations, will continue to be inspected, maintained, and repaired according to the *Final Preconstruction Operation and Maintenance Plan, Parcel D-1, Hunters Point Shipyard, San Francisco, California* (ChaduxTt, 2011c) until the *Post-Construction Operation and Maintenance Plan, Remedial Action in Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (APTIM, 2017) is finalized. In general, any deficiencies that reduce the effectiveness of the cover to protect human health and the environment will be corrected. In some cases, damaged areas may need to be temporarily secured to prevent access by the public while repairs are planned and implemented.

5.2 Land Use Controls

The LUC objectives for Parcel D-1 that apply to the cover design presented in the DBR (ChaduxTt, 2011a) include maintaining the integrity of the cover and preventing damage to any site security features (such as fencing and signs) that may be necessary. The DBR included fencing and signs to control access as part of the remedy; however, fencing and signs are not requirements of the ROD (Navy, 2009) and may not be necessary after the site is transferred and redeveloped. The LUCs are described in the *Land Use Controls Remedial Design, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (Gilbane, 2017b).

Parcel D-1 is owned by the federal government under the jurisdiction of the Navy and is planned to be transferred to the CCSF. The *Amended Hunters Point Redevelopment Plan* (Former SFRA, 2010) contains scenarios that include residential reuses for portions of Parcel D-1. Residential uses could include dwelling units, live/work units, and group housing, as well as related institutional uses such as schools and child-care facilities. The procedures to modify the durable cover are restricted throughout Parcel D-1 unless prior written approval for these activities is granted by the Federal Facilities Agreement (FFA) signatories. LUCs are described in detail in the *Land Use Controls Remedial Design, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (Gilbane, 2017b). Modifications to the durable cover will require a

revision of the *Post-Construction Operation and Maintenance Plan, Remedial Action in Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (APTIM, 2017) to account for changes in the inspections and repairs necessary to maintain the remedy.

The activity and land use restrictions described in the *Land Use Controls Remedial Design, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (Gilbane, 2017b) will be incorporated into the Quitclaim Deed and Covenant to Restrict Use of Property and will take effect upon transfer to the CCSF and issuance of those documents.

6.0 Community Involvement

Prior to the start of work, the RAWP (CB&I, 2016) was made available to the public at two local repositories: City of San Francisco Main Library and HPNS Library (located near the entrance to the base). Community bus tours were held during the pre-construction planning and construction phases of the project (on May 14, 2016, August 6, 2016, April 8, 2017, and August 5, 2017) to apprise community members of the remediation work being performed at HPNS. At each of the bus tours, the attendees were invited to ask questions of the Navy to discuss and ask representatives from the regulatory agencies questions about the remediation activities at HPNS. The Navy also updated the regulatory agencies on the progress of the project, and that information was relayed to the community through a variety of agency outreach initiatives.

A Fact Sheet was prepared to describe the work performed as part of the RA and to document successful completion of the RA. The Fact Sheet is included in Appendix L and will be distributed electronically and in hard copy to the HPNS community mailing list following final acceptance of this RACR. The HPNS distribution list contains approximately 2,500 recipients.

7.0 Certification Statement

I certify that this RACR memorializes completion of the construction activities to implement the RA at Parcel D-1 (excluding the Phase II durable cover) at the former HPNS, San Francisco, California. The RA was implemented pursuant to the ROD (Navy, 2009) and the DBR (ChaduxTt, 2011a), and in accordance with the RAWP (CB&I, 2016), with deviations noted herein. This RACR documents the achievement of the groundwater and radiologically impacted soil and structures RAOs achieved through proper implementation and satisfactory completion of the final remedy. The soil RAO was met for Parcel D-1 Phase I by the installation and maintenance of a durable cover. The Parcel D-1 Phase II durable cover will be installed in 2018.

The Navy is currently implementing monitoring and maintenance of the Parcel D-1 Phase I durable cover in accordance with the *Final Preconstruction Operation and Maintenance Plan, Parcel D-1, Hunters Point Shipyard, San Francisco, California* (ChaduxTt, 2011c) until the *Post-Construction Operation and Maintenance Plan, Remedial Action in Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California* (APTIM, 2017) is finalized. The LUC objectives will be met by controlling site access until the time of property transfer. The activity and LUC described in the RD will be incorporated into the Quitclaim Deed and Covenant to Restrict Use of Property and will take effect upon transfer and issuance of those documents.

Derek Robinson
BRAC Environmental Coordinator
Hunters Point Naval Shipyard

Date

8.0 References

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Figures

Tables

Table 1
Monitoring Well Coordinates

Well ID	Northing	Easting	Top of Casing Elevation (feet above msl)
IR22MW07A	450,787.156	1,461,474.218	8.21
IR22MW08A	450,865.001	1,461,200.108	9.36
IR22MW15A	450,629.22	1,461,057.43	10.66
IR22MW16A	450,478.866	1,461,282.116	8.39
IR22MW20A	450,699.086	1,461,260.221	9.55
IR35MW01A	450,840.087	1,461,013.642	9.38

Notes:

Horizontal coordinates are based on the North American Datum of 1927 (NAD 27) Zone-III (Hunters Point West 1 PID HT0613).

Vertical elevations are based on the National Geodetic Vertical Datum of 1929 (NGVD 29).

msl *mean sea level*

Table 2
Demonstration of Completion of Remedial Action Objectives for Parcel D-1 (Excluding the Phase II Durable Cover)

No.	RAO	Demonstration of Completion	RAO Met (Yes/No)
Soil			
1.	Prevent exposure to PAHs and metals in soil at concentrations above remediation goals developed in the HHRA for the following exposure pathways: Ingestion of, outdoor inhalation of, and dermal exposure to surface and subsurface soil by industrial workers or construction workers.	As part of this RA, the Navy installed a durable cover in Parcel D-1 Phase I to prevent or minimize exposure to COCs in soil by ingestion, outdoor inhalation, and dermal exposure at concentrations exceeding remediation goals. The durable cover provides a physical barrier to prevent or minimize exposure of humans to COCs above remediation goals. The durable cover constructed in Parcel D-1 Phase I included seawall stabilization, an asphaltic pavement cover, and repaired building foundations. The specific cover that was installed in Parcel D-1 was designed to be durable and stable to reliably prevent or minimize future exposure to COCs in soil for extended periods of time with minimal maintenance. Routine O&M will be performed to prevent or minimize future exposure of humans to COCs in soil by ingestion, outdoor inhalation, and dermal exposure at concentrations exceeding remediation goals. The O&M program will ensure that the remedy, including durable covers, is performing as intended.	Yes
2.	Prevent exposure to VOCs in soil gas at concentrations that would pose unacceptable risk via indoor inhalation of vapors. Remediation goals for VOCs to address exposure via indoor inhalation of vapors may be superseded based on COC identification information from future soil gas surveys. Future action levels would be established for soil gas, would account for vapors from both soil and groundwater, and would be calculated based on a cumulative risk level of 10^{-6} using the accepted methodology for risk assessments at HPNS.	ICs are in place and being enforced to prevent exposure to high concentrations of VOCs in soil gas. Any proposed construction of enclosed structures must be approved in accordance with the "Covenant(s) to Restrict Use of the Property," Quitclaim Deed(s), LUC RD report (Gilbane, 2017b), and the RMP with approval of the FFA signatories prior to the conduct of such activity within the ARIC for VOC vapors to ensure that the risk of potential exposure to VOC vapors are reduced to acceptable levels that are adequately protective of human health. The Navy performed a soil gas survey in September 2010 for areas within Parcels B, D-1, G, and UC-2 (Sealaska Environmental Services, 2013). A total of 30 grid blocks were sampled at Parcel D-1. Soil gas results collected from eight blocks indicated a potential risk to a future residential receptor that exceeded 10^{-6}. Consequently, the ARIC for VOC vapors was recommended to be reduced	Yes

No.	RAO	Demonstration of Completion	RAO Met (Yes/No)
		from all of Parcel D-1 to the eight blocks where the potential risk exceeded 10^{-6}.	

Table 2 (continued)
Demonstration of Completion of Remedial Action Objective for Parcel D-1, Phase I

No.	RAO	Demonstration of Completion	RAO Met (Yes/No)
Groundwater			
1.	Prevent exposure by industrial workers to VOCs in the A-aquifer groundwater at concentrations above remediation goals via indoor inhalation of vapors from groundwater.	The Navy will rely on ICs in the form of environmental restrictive covenants at the time of property conveyance, as provided in LUC RD report (Gilbane, 2017b), to prevent exposure of construction workers to A-aquifer groundwater with COC concentrations exceeding remediation goals from dermal contact with and inhalation of vapors from groundwater. Specifically, IC performance objectives restrict land-disturbing activity unless prior written approval is granted by the FFA signatories and CDPH.	Yes
2.	Prevent or minimize exposure of construction workers to metals and VOCs in the A-aquifer groundwater at concentrations above remediation goals from dermal exposure and inhalation of vapors from groundwater.	The Navy will rely on ICs in the form of environmental restrictive covenants, as provided in LUC RD report (Gilbane, 2017b), at the time of property conveyance, to prevent exposure of humans to groundwater with COC concentrations exceeding remediation goals through the domestic use pathway. Specifically, IC performance objectives prohibit the use of groundwater and restrict land disturbing activities that may cause or facilitate movement of known contaminated groundwater.	Yes
Radiologically Impacted Soil and Structures RAOs			
1.	Prevent exposure to radionuclides of concern in concentrations that exceed remediation goals for all potentially complete exposure pathways.	The Navy identified and removed historical subsurface storm drain and sanitary sewer utilities beneath Parcel D-1 and remediated buildings in Parcel D-1 as part of the TCRA for radionuclides (CB&I, 2014; Gilbane, 2017a).	Yes

Notes:

ARIC	*area requiring institutional control*	*O&M*	*operation and maintenance*
CB&I	*CB&I Federal Services LLC*	*PAH*	*polycyclic aromatic hydrocarbon*
CDPH	*California Department of Public Health*	*RA*	*remedial action*
COC	*chemical of concern*	*RAO*	*remedial action objective*
FFA	*Federal Facilities Agreement*	*RD*	*remedial design*
HHRA	*human health risk assessment*	*RMP*	*risk management plan*
HPNS	*Hunters Point Naval Shipyard*	*ROD*	*Record of Decision*
IC	*institutional control*	*TCRA*	*time-critical removal action*
LUC	*land use control*	*VOC*	*volatile organic compound*
Navy	*U.S. Department of the Navy*		

Table 2 (continued)
Demonstration of Completion of Remedial Action Objective for Parcel D-1, Phase I

References:

CB&I Federal Services LLC, 2014, Final Radiological Removal Action Completion Report, Radiological Surveys of Buildings and Ground Surfaces, and Storm Drain and Sanitary Sewer Removal, Parcel D-1, Phase 1, Hunters Point Naval Shipyard, San Francisco, California, January.

Gilbane, 2017a, Removal Action Completion Report, Parcel D-1, Phase II Radiological Remediation and Support, January.

Gilbane, 2017b, Land Use Controls Remedial Design, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, California.

U.S. Department of the Navy, 2009, Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California, July 24.

Table 3
Summary of Waste Materials from Parcel D-1 Phase I

Waste Type	Waste Profile Number	Dates of Transportation	Disposal Weight/Volume	Waste Class	Disposal Facility
Construction Debris	NA	June 13–November 8, 2016	340 cy	Non-hazardous (Disposed)	Recology Transfer Station 501 Tunnel Avenue San Francisco, CA 94134
Construction Debris including ceramic electrical insulators	NA	August 2, 2016	20 cy	NA	Transferred to Navy's Radiological Basewide Radiological Contractor for subsequent disposal by the Navy's LLRW Contractor
Scrap Metal	NA	June 24–November 11, 2016	87 tons by weight	Non-hazardous (Recycled)	Circosta Iron & Metal Company Recycling Center 1801 Evans Avenue San Francisco, CA 94124
Concrete Debris	NA	July 12, 2016	40 cy	Non-hazardous (Recycled)	Recology Transfer Station 501 Tunnel Avenue San Francisco, CA 94134
Weathered Wood (creosote)	4212-161-7342	November 7–8, 2016	60 cy	Non-hazardous Special Waste	Keller Canyon Landfill 901 Bailey Road Pittsburg, CA 94565
Soil	NA	NA	Four overpack drums	NA	Pending disposal under Phase II
Lighting Ballasts	NA	NA	One overpack drum	NA	Pending disposal under Phase II
Potential asbestos containing material	NA	July 6, 2017	One overpack drum	NA	Transferred to Navy's Waste Disposal Contractor for disposal

Notes:

CA	*California*
cy	*cubic yard*
LLRW	*low-level radioactive waste*
NA	*not applicable*
Navy	*U.S. Department of the Navy*

Appendix A
Submittals

(provided on electronic copy only)

Appendix B
Pre-Construction and Mutual Understanding Meeting Minutes
(provided on electronic copy only)

Appendix C
Stormwater Management Paperwork
(provided on electronic copy only)

Appendix D
Air Monitoring Report
(provided on electronic copy only)

Appendix E
Photograph Log

Appendix F
Construction As-Builts

Appendix G
Import Sampling Results and Data Validation
(provided on electronic copy only)

Appendix H
Geotechnical Data

(provided on electronic copy only)

Appendix I
Water Quality Monitoring Results
(provided on electronic copy only)

Appendix J
Waste Data and Waste Manifests
(provided on electronic copy only)

Appendix K
Pre-Final and Final Inspection Checklists
(provided on electronic copy only)

Appendix L
Fact Sheet